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CORE LIST

cassette tapes for interpretation

by j. alan wagar

When this work was done, J. Alan Wagar was leader of the Environmental Interpretation Research Project, formerly maintained by the U.S. Forest Service in cooperation with the College of Forest Resources, University of Washington, Seattle. He is currently leader of the Recreation Research Project maintained by the Forest Service in cooperation with the State University of New York College of Environmental Science and Forestry, Syracuse.

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CASSETTE TAPES FOR INTERPRETATION 2023

Reference Abstract

Wagar, J. Alan

1976. Cassette tapes for interpretation. USDA For. Serv. Res. Pap. PNW-207, 20 p., illus. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

Interpretation using portable tape players and cassettes provided significantly greater enjoyment and short-term retention of information on a visitor trail than either trail signs or a trail leaflet. Tape format using questions increased retention of the information so emphasized but at the risk of reducing retention of other information. On-the-ground costs were estimated as between 4 and 9 cents per visitor contact.

KEYWORDS: Recreation, information and education, information media, interpretation, environmental education.

RESEARCH SUMMARY

Research Paper PNW-207

1976

Interpretation using portable tape players and cassette tapes was tested on a nature trail and, to a limited extent, for an interpretive auto tour. Purposes of the tests were (1) to compare the effectiveness of tapes with that of trail signs and leaflets, (2) to compare the effectiveness of taped presentations organized in different ways, and (3) to examine the administrative and logistic problems associated with issuing tape players. Criteria for "effectiveness" were visitor enjoyment and short-term retention of information.

Taped presentations were significantly more effective than either trail signs or a trail leaflet (fig. 1). The sparing use of questions to emphasize key points was found to increase the retention of information so emphasized. For synchronization with attractions, tapes for auto tours need to be keyed

to mileage markers or other readily identified features.

If introductory information is given at the beginning of a tape, visitors must have sufficient walking (or driving) distance to proceed at normal speed before passing the first interpretive station before it is discussed on tape.

On-the-ground costs for using cassette tapes and players were estimated at between 4 and 9 cents per visitor contact provided that equipment is offered at an existing facility where personnel already available can handle it. Although requiring recipients to sign a receipt avoided theft or willful damage during the study, procedures probably would need to be developed to recover unreturned equipment, to collect a deposit sufficient to guarantee its return, or both.



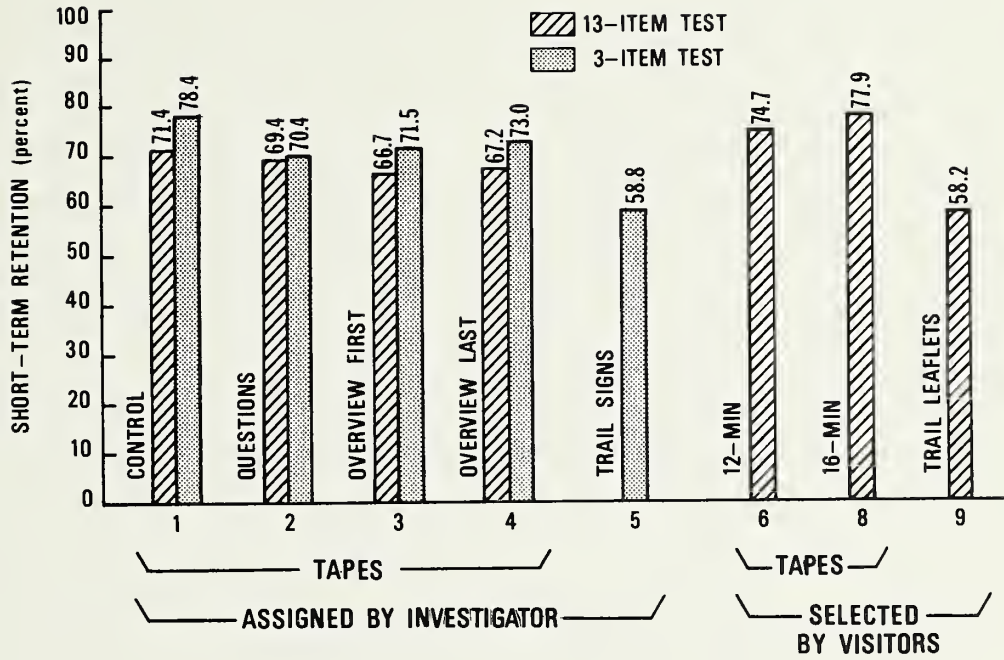


Figure 1.--Average short-term retention of information for the Trail of the Restless Waters, Siuslaw National Forest, Oregon, 1971. Retention for the tapes was significantly greater ($P < 0.01$) than retention for either the trail signs or the trail leaflet.

INTRODUCTION

Cassette tapes and portable tape players are increasingly being used to provide recreationists with information and enjoyment in the places they visit. Recorded walking or auto tours are now available for many of the world's major cities, several National Park Service areas, Niagara Falls, and other attractions. Some of these tapes include over an hour of actual narration.

Previous studies have shown that visitor interest averages greater when information is heard rather than read (Mahaffey 1969, Washburne and Wagar 1972) but offered few conclusions about the amount of information transmitted to and retained by visitors. It seemed likely, however, that recorded messages would permit visitors to absorb substantial amounts of information without looking away from main attractions and with minimal fatigue (Erskine 1964).

To find out if this is true, a study was conducted during the summer of 1971. Purposes of the study were (1) to compare the effectiveness of cassette tapes with that of trail signs and leaflets, (2) to compare the effectiveness of taped presentations structured in four different ways, (3) to obtain some insights on cassette tape auto tours, and (4) to examine the administrative and logistic problems associated with issuing tape players.

Criteria for "effectiveness" were visitor enjoyment and short-term retention of information. Long-term effects of information have been found to be proportional to short-term effects (Cromwell 1955).

AREAS STUDIED

The major part of the study was conducted at the Trail of the Restless Waters at Cape Perpetua, 24 miles north of Florence on the Oregon coast. This half-mile loop trail starts in a forest and then passes through areas of lower vegetation, down along the intertidal zone, and back through the forest to the starting point beside a parking lot (fig. 2)

The trail interprets the forces that have shaped the Oregon coast, including vulcanism, climate and vegetation, tides and wave action, and sea life. A major feature near the beginning of the trail is the Devil's Churn, a wave-cut cleft and cave in a large shelf of basalt.

Most visitors were attracted to the trail by a highway sign reading "Devil's Churn Overlook, 1,000 feet." As a result, many of them had not intended to walk the whole length of the trail. Some people, however, were using this and other trails in conjunction with their visit to the Cape Perpetua Visitor Center approximately half a mile away.

A second location for this study was the scenic Mount Baker Highway in the Mount Baker-Snoqualmie National Forest of northwestern Washington. Late in the summer, a cassette auto tour was developed and tested for a short time on this road. The tour began at the Glacier Guard Station 34 miles east of Bellingham, Washington. Starting at an elevation of 900 feet, the tour took visitors up through several life zones to an elevation of over 4,000 feet at Heather Meadows, 22 miles from the starting point. Because the Mount Baker Highway is a dead end road, visitors returned the way they entered.



Figure 2.--Trail of the Restless Waters, Siuslaw National Forest, Oregon. The trail begins at the lower parking lot, passes through the forest and open areas to the intertidal zone, and then circles back through the forest to the parking lot. A side trail winds down to the Devil's Churn at lower right of picture.

PROCEDURES

Treatments

Field work for the study was conducted in three phases (table 1). In the "assignment" phase, visitors walking the Trail of the Restless Waters were given one of four cassette tape presentations or used only the existing trail signs. In the "self-selection" phase, also on this trail, a "smorgasbord" of options was offered visitors, including three revised cassette tapes, a trail leaflet, and the option of using the trail and trail signs

unassisted. The "auto tour" phase was a limited test of cassettes on the Mount Baker Highway.

Eight different cassette tapes were developed and duplicated to provide 8 to 10 copies of each for the tests. Excess tape was removed from each cassette, leaving only a few seconds at each end without recorded information. For all but the auto tour tape, sides 1 and 2 of each cassette were identical. Thus, after a visitor or group finished one side, the cassette could simply be turned over and issued to the next visitor(s) with no rewinding.

Table 1--Treatments used in study of cassette tapes for interpretation, Siu-slaw and Mount Baker-Snoqualmie National Forests, 1971.

Assignment phase (Treatments assigned to interested visitors)	Self-selection phase (Visitors selected own treatments)	Auto tour phase (Available to visitors who stopped at Glacier Guard Station)
<p><i>Treatment 1 (control tape)</i>--A 19-minute cassette tape with no attempt to tie information for the 12 trail stations into a unified theme. Interpretation covered the wind-shaping of trees, effects of shade on ground cover, waxy leaves as an adaptation to salt spray, formation of the Devil's Churn, the origin of waves and tides, local plants and birds, life history of the barnacle, formation of tide pools, the intertidal zone, Indian shell mounds, and characteristics of red alder. Narration nonprofessional.</p>	<p><i>Treatment 6 (12-minute revised tape)</i>--A 12-minute cassette tape like Treatment 2 but shortened, using fewer questions and professional narration.</p> <p><i>Treatment 7 (Devil's Churn tape)</i>--Like Treatment 6 but using 5 minutes of narration to guide visitors only as far as the Devil's Churn (Trail Station 5). It then offered the option of returning immediately to the parking lot or first walking a few feet to Station 6 and hearing a 3-minute discussion of the forces shaping the Oregon coast.</p>	<p><i>Auto tour tape</i>--A cassette tape designed for an auto tour of 3 or more hours with several stops and two side trips. Side 1 of the cassette took people the 22 miles from Glacier Guard Station to Heather Meadows, using 25 minutes of narration presented in six segments. The start of each segment was keyed to a mileage marker or other clear feature. Side 1 interpreted the climate, vegetation, and animals of the life zones crossed; glaciation, geology, and rock types; the Nooksack Indians; and early mining history.</p> <p>Side 2 offered two side trips during the return from Heather Meadows: The White Salmon Creek Road (7 minutes of narration in four segments) and the Glacier Creek Road (12 minutes of narration in four segments). These side trips interpreted the mountains, glaciers, and other features visible in two panoramic views; a salmon run; and an early race to the top of Mount Baker and back.</p> <p>Narration was nonprofessional with two male voices alternating. In addition, a recording (poor quality) of an old prospector telling an anecdote was included.</p>
<p><i>Treatment 2 (question tape)</i>--A 22-minute cassette tape identical to Treatment 1 except that key items of information were preceded by leading questions or were phrased as questions. For example, "Did you know that barnacles are crustaceans, related to the crabs and lobsters?"</p>	<p><i>Treatment 8 (16-minute revised tape)</i>--Similar to Treatment 6 but giving slightly more detail.</p> <p><i>Treatment 9 (Trail leaflet)</i>--A slightly abridged transcript of Treatment 1, including approximately 2,100 words, presented on a 4-page leaflet made by folding light green 8½- x 11-inch paper to a 5½- x 8½-inch format. This was typed (elite) with space-and-a-half vertical arrangement and reduced to give rather small print having 19 characters per horizontal inch.</p>	
<p><i>Treatment 3 (theme-first tape)</i>--A 20-minute tape identical to Treatment 1 except introduced by an "overview" showing that all information fit a theme concerning the forces shaping the Oregon coast.</p>		
<p><i>Treatment 4 (theme-last tape)</i>--A 21-minute tape identical to Treatment 1 except followed by an overview showing that all information fit a theme concerning the forces shaping the Oregon coast.</p> <p><i>Treatment 5 (signs only)</i>--Exposure to the nine existing trail signs without other assistance. These signs interpreted the wind-shaping of trees, formation of the Devil's Churn, the origin of waves and tides, formation and residents of tide pools, beach safety, and where alder trees grow.</p>		

Data Collection

The "assignment" phase was conducted from approximately 9 a. m. to 6 p. m. daily except Tuesday and Wednesday, from June 19 to July 5 and from July 30 to August 9, 1971. Visitors walking the trail (fig. 3) were presented with one of five treatments (four tapes and using the trail signs unassisted), according to a previously developed random schedule. The first 10 visitor groups were presented with the first treatment on the schedule, the next 10 groups with the next treatment, etc. Most groups consisted of family members or friends who arrived at the trail in one vehicle.

Within each group accepting a tape and tape player, one person was required to sign a receipt giving his name, address, and vehicle license number. Tapes and players were issued by a man in Forest Service

uniform. Receipts were returned to the individuals when they returned the equipment at the end of the trail.

Each tape interpreted information at 12 numbered stations along the trail. After each segment of the tape, the visitor was told to turn off the tape player until reaching the next numbered post. Narration was in a nonprofessional voice, without music or other special effects. The final message on each tape was:

Now, please walk on up the trail and turn in the tape player to the man wearing the name tag. Also, because the Forest Service is conducting a study to improve its visitor services, we'd appreciate your answering a few questions concerning this trail. Thank you, and have a good visit to the Siuslaw National Forest and the Oregon coast.



Figure 3.--Visitors listening to taped interpretation of life in the tide pools.

At the end of the trail, each visitor 12 and older was given a clipboard with a pencil and questionnaire attached. (See appendix.) A bench was provided so visitors could sit while answering the questions (fig. 4). Questionnaires were administered by a man in uniform. They covered levels of enjoyment, retention of information, how visitors learned of the trail, and what they liked most and least about it. Questions also covered age, sex, number of people in group, present and expected education, occupation, and place of residence. In addition, each questionnaire provided space and invited comments and suggestions concerning the trail.

Levels of enjoyment were determined by asking each respondent:

Compared to other trails you have been on or walks you have taken, was the trail

less enjoyable _____
about as enjoyable _____
more enjoyable _____

Less enjoyable, about as enjoyable, and more enjoyable were coded as 1, 2, and 3, respectively.

Multiple-choice questions were used to test for short-term retention of information. Because the nine trail signs covered only part of the information provided on the tapes, two questionnaire



Figure 4.--Questionnaires were used to determine how much information visitors to the interpretive trail retained and how much they enjoyed their experiences.

forms were used. There were identical except for color and for the number of test questions. Visitors exposed only to the trail signs were given the short form with four test questions covering information presented on the trail signs. People using the tape players were given the longer form with 14 test questions. Four of these were the test questions used on the short form and covered information given both on the trail signs and on the tapes. The additional 10 test questions covered information presented only on the tapes.

During the first or "assignment" phase of the study, 2,185 questionnaires were administered, of which 2,175 were usable.

The second or "self-selection" phase was conducted on August 9 and from August 12 through 15, 1971, again from approximately 9 a. m. to 6 p. m. For this phase, three revised tapes and a trail leaflet were used. On the revised tapes, both tape length and the number of questions asked were reduced. Also, the original voice was replaced with that of a professional radio announcer. The 12- and 16-minute revised tapes (Treatments 6 and 8) retained the statement asking visitors to return the tape players and answer a few questions. As in the "assignment" phase, each tape was cut to length with identical recording on the two sides.

During the "self-selection" phase, visitors had a choice of the three revised tapes, the trail leaflet, and walking the trail with no assistance other than the nine existing trail signs. The tapes, players, and leaflets were placed on a table at the entrance to the trail, and each group of visitors approaching the trail was met by a man in uniform who explained the options.

Receipts for tapes and tape players were required as in the "assignment" phase.

During this phase, questionnaires were administered only to visitors using the 12- or 16-minute revised tapes (Treatments 6 or 8) or the trail leaflet (Treatment 9). Data for comparing tapes and trail signs had been taken during the "assignment" phase, and the only remaining option (the "Devil's Churn" tape, Treatment 7) covered but a small part of the trail. Records were kept of the number of parties using each tape, using the leaflet, or walking the trail unassisted. Reasons volunteered for not taking the tapes or leaflets were also recorded. Of the 635 questionnaires administered, 632 were usable.

The third or "auto tour" phase began September 4 (Labor Day weekend) and ran continuously through September 12. Because people were not stopped by signs or other means, the only visitors offered the tour tape and tape player were those stopping for information at the Glacier Guard Station. As in the first two phases, a receipt was required for each tape player issued.

The tape included 44 minutes of narration in 14 segments. The first side included six segments and took visitors from the Glacier Guard Station to Heather Meadows. The second side offered two short side trips that visitors could take while returning from Heather Meadows. Each side trip included four segments of narration. At the end of each segment, visitors were instructed to turn off the tape player and turn it back on when reaching a specified roadside mileage marker or other readily identified feature. The Mount Baker Highway has these markers at 1-mile intervals.

No questionnaires were used, but each carload of visitors borrowing a tape and player was supplied with a clipboard, pencil, and a 5-1/2- x 8-1/2-inch sheet with the following words at the top:

The Forest Service is offering these tapes on an experimental basis. If you wish to make comments or suggestions, we will be happy to have them.

Analysis

Data for the Trail of the Restless Waters were examined by analyses of variance and covariance using the NYBMUL program. Orthogonal comparisons were made to test for differences between tapes and the trail signs, between tapes and the trail leaflet, and to examine the effects of using questions within a presentation.

The covariates were used only if they increased the sensitivity of the analyses; they were age, sex, group size, whether or not respondents were residents of Oregon, and education expected at completion. Because many respondents were still in school, expected education was considered a better indicator of attitudes toward learning than was education actually completed.

Because visitors normally travel and use trails with family or friends, questionnaire data were not completely independent. Analyses were therefore made using group (cluster) means rather than individual values for each variable. Also, the NYBMUL program could deal with unequal subclass frequencies at only one level, and this capacity was used to handle the different numbers of visitors exposed to the different interpretive presentations (treatments). Group means, therefore,

were not weighted by group size.

Correct responses to the question concerning the effect of shade on ground-cover vegetation ranged from 93 to 97 percent for the various treatments, suggesting that this was common knowledge and provided no information about the effectiveness of treatments. By contrast, for the question having the second highest number of correct responses, percentages for the different treatments ranged from 61 to 93. The shade question was therefore eliminated, leaving 3-item test scores for comparing Treatments 1 through 5 and 13-item test scores for comparing Treatments 1 through 4 and Treatments 6, 8, and 9.

Although statistical analyses were not made for the taped auto tour, visitor reactions and comments were examined for the general insights they provided.

RESULTS

Interpretation of the nature trail by cassette tapes gave significantly greater visitor enjoyment and short-term retention of information than either trail signs or the trail leaflet (figs. 5 and 1). During Phase 1 when tape length averaged over 20 minutes, a few visitors complained of the slowness and said they would prefer leaflets permitting them to scan ahead to the information they desired.

Among the taped presentations, only two important differences were found. First, contrary to expectations, more information was retained from the "control" tape (Treatment 1) than from three tapes testing procedures for increasing what visitors remembered (Treatments 2, 3, and 4). Second, the

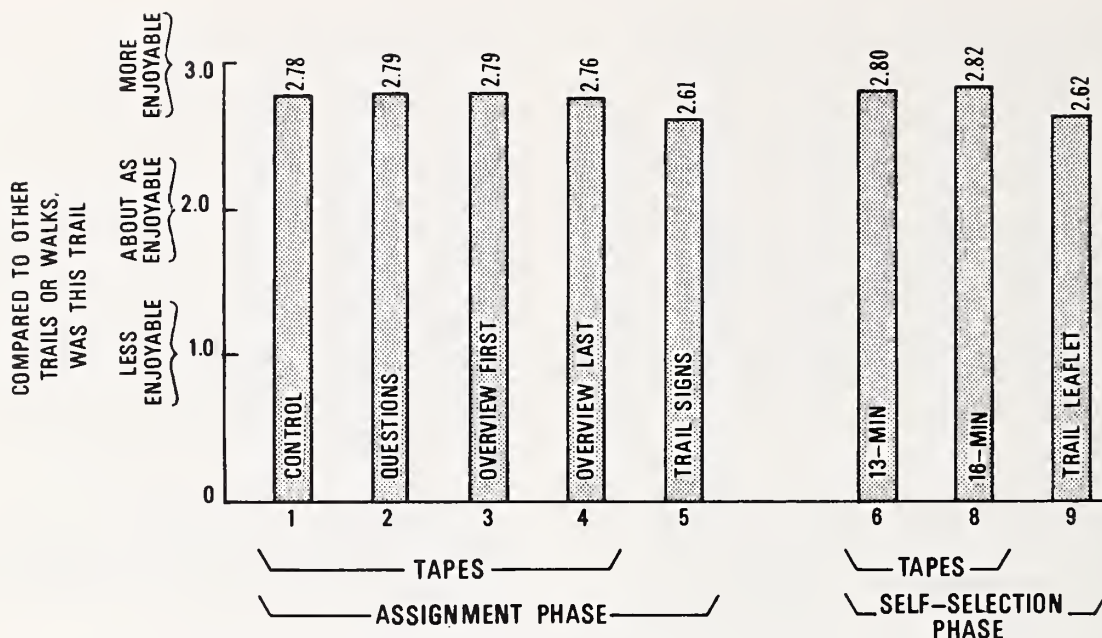


Figure 5.--Although differences in average visitor enjoyment were not great, tapes gave significantly greater enjoyment ($P < 0.01$) than either the trail signs or the trail leaflet. Trail of the Restless Waters, Siuslaw National Forest, Oregon, 1971.

"question" tape (Treatment 2) showed that questions within an interpretive presentation can help visitors remember selected information but only at the risk of decreasing their retention of information that is not emphasized with questions.

Overall test scores for the "question" tape were not significantly different from the scores for the other three tapes tested during the "assignment" phase of the study. However, a significant difference among these treatments was found when questioning within a presentation was analyzed as a dual effect that increased the retention of information emphasized by questions while decreasing retention of information not so emphasized. For a sensitive test of this dual effect, each 13-item test score was divided into two subscores. Subscore A included only the eight test items associated with information emphasized by questioning within the "question" tape (Treatment 2). Subscore B included the remaining five test

items. The difference between subscore A and subscore B registers both the increases and decreases in retention caused by questioning. As shown in figure 6, the average difference between subscores A and B was significantly greater for the "question" tape (Treatment 2) than for the other tapes used during the "assignment" phase of the study (Treatments 1, 3, and 4).

Both visitor enjoyment and short-term retention of information increased when experience from the "assignment" phase was used to develop improved tapes for the "self-selection" phase (figs. 5 and 1). This involved shortening, changing to a "professional" voice, using questions sparingly, and eliminating the introductory material that many visitors had disregarded enough that the tape and numbered trail stations became unsynchronized.

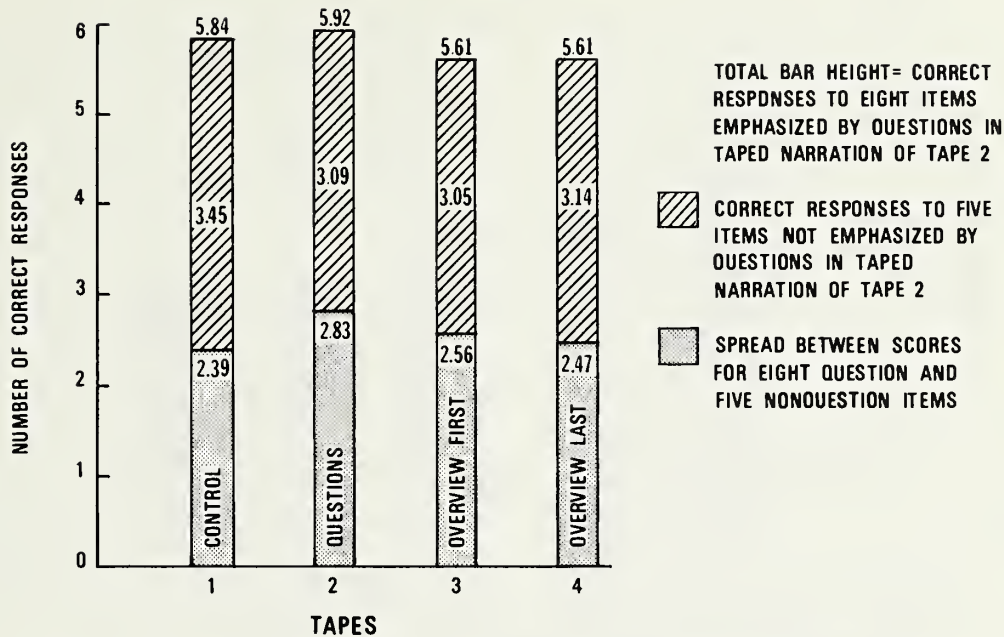


Figure 6.--Questions used within the "question" tape increased retention for information so emphasized (total bar height), while reducing retention for information not so emphasized (hachured portions of bars). The differences between the two subscores (internal scores of bars) reflect the combined (positive and negative) effects of questions within a presentation. This was significantly greater ($P < 0.05$) for the "question" tape than for the tapes without questions. Trail of the Restless Waters, Siuslaw National Forest, Oregon, 1971.

Statistical testing for differences between these two phases was not appropriate because they occurred at different times and may have involved different conditions or different kinds of users.

Of the 548 visitor groups given a choice among five different options during the "self-selection" phase, nearly two-thirds selected one of the three tapes offered (fig. 7). The short "Devil's Churn" tape (Treatment 7, chosen by 30 percent of the visitor groups) was the most popular. This was followed by the trail leaflet (Treatment 9, 22 percent) and the 12-minute revised tape (Treatment 6, 20 percent). Tying for last place (at 14 percent each) were the 16-minute revised tape (Treatment 8) and walking the trail unassisted. The 16-minute revised tape (Treatment 8) provided higher visitor enjoyment and

greater retention of information than any other presentation examined in this study.

The taped auto tour was also well received, even though it was a "first cut" with some obvious imperfections. Of the 50 carloads of visitors offered the tape, 41 accepted it, 34 completed side 1 (Glacier to Heather Meadows), and 28 listened to both sides. Thirty-five groups commented on the tape. Of the 108 comments received, 64 were complimentary, 21 registered such complaints as "prospector hard to understand" and 23 were either neutral (such as "hope people return equipment") or suggested such additions as "more geology." The most common category of comments consisted of 35 such nonspecific compliments as "interesting," "well done," "beneficial," and "good variety of information."

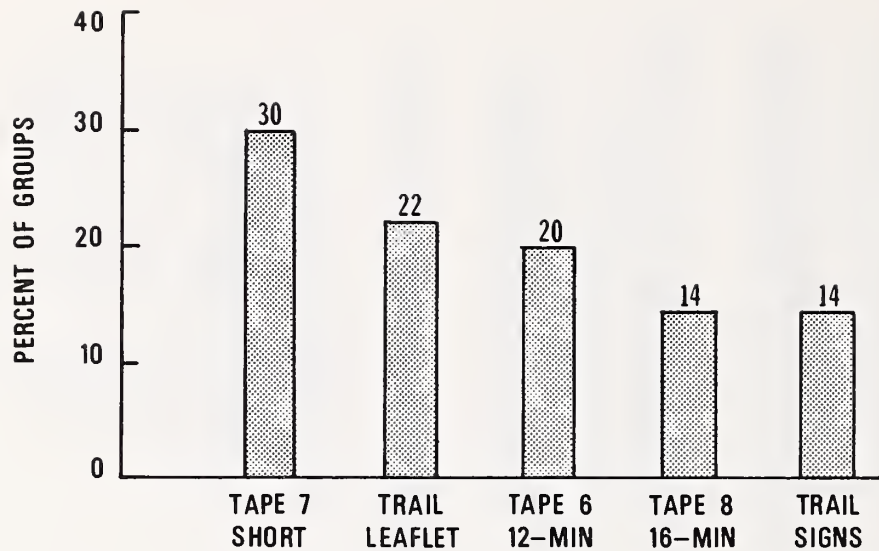


Figure 7.--Percent of visitor groups selecting each of five interpretive options, Trail of the Restless Waters, Siuslaw National Forest, Oregon, 1971.

Twenty of 24 inexpensive tape players (purchased during a "close-out special" at \$6 to \$8 each) did not withstand continuous use and had to be retired. However, one of them was still going after being issued 134 times and being played for over 39 hours. Three moderately priced brands of tape players (\$20 to \$30 each) held up quite well, requiring only periodic replacement of batteries. The most heavily used of these was issued 152 times and played for over 42 hours. A "rewind" control was welcomed by the few visitors who wished to hear part of a tape a second time.

No theft or willful damage was encountered during any phase of the study. One inexpensive tape player was damaged beyond repair when drenched by a high wave, along with the visitor who was carrying it among the tide pools. Another visitor hid a tape player in the bushes to avoid such risks while the group he was with spent over an hour among the tide

pools. Later he hurried to the parking lot to report the tape player missing and was much relieved to learn that another visitor had spotted it and turned it in. On the Mount Baker Highway, some visitors stayed much later than planned. One tape player was returned late in the evening to a Ranger's residence. Two others were kept overnight and returned the next day.

DISCUSSION

Most of the added visitor enjoyment and retention of information provided by the taped presentations--as compared with trail signs and the trail leaflets--probably resulted because it is easier to listen than to read, especially while trying to examine a variety of attractions. Revision of the trail signs and the leaflet might have increased enjoyment and retention. The signs were not considered the best that could have been done. And the trail leaflet, with

its small print and lack of illustrations, was also far from outstanding. Substantial improvements, however, would have been required to equal the effectiveness achieved by tapes. And as the author's first such venture, the tapes also left room for improvement.

In contrast with the results reported here, Feldman (1975) found retention of information from a well-illustrated auto tour brochure to be approximately the same as from cassette tapes and players. Perhaps reading in a car is easier than on a trail. Also, brochures usually would have been read aloud by one passenger, fixing details in his mind while providing the driver and other passengers with a spoken presentation.

Two factors help to explain the greater retention found for the "control" tape than for the other tapes used in the "assignment" phase. The novelty of the cassette tapes and players seemed to motivate high visitor interest for all tapes used. Thus, selected approaches for making the "treatment" tapes extra effective apparently did not add substantially to the high interest and motivation that already prevailed. Furthermore, the treatment tapes had some weaknesses, especially the tape introduced by an "overview." This had the lowest retention scores of any tape tested.

The introduction on this tape took 1 minute and 50 seconds and was designed to "preprogram" people and provide a conceptual framework to tie details together--effects Screven found for a pretest in a museum setting.^{1/}

^{1/} Personal communication with C. G. Screven, Professor of Psychology, University of Wisconsin at Milwaukee, 1970.

In contrast with Screven's pretest, the introductory overview did not suggest to visitors that they were involved in an experiment and might be tested on what they remembered.

However, this lengthy introduction did not accommodate the desire of most visitors to walk down the trail immediately after receiving a tape player. Even when asked to stand and listen before walking, most visitors turned on the player and began moving, usually walking as far as Station 3 before hearing interpretation for Station 1, 10 feet from where tape players were issued.

Surprisingly, the poor coordination between numbered stations and trail segments at the beginning of the trail resulted in reduced retention primarily among the last 5 of the 12 stations. By the time visitors reached these stations, they had ample opportunity to synchronize the numbered posts and tape sequences. The initial lack of synchronization may have affected people's expectations so that getting tapes and trail stations synchronized did not seem especially important. For example, some groups let the tape play continuously but also walked continuously so the tape never did catch up with their position.

If visitors tried to match the unsynchronized tapes and trail stations in their minds, they would have had to deal with a continually growing amount of taped information and visual impressions. A growing burden upon memory is consistent with reduced retention toward the end of the trail. However, levels of enjoyment did not differ significantly among the four tapes tested during the "assignment" phase of the study. The fact that an apparent burden upon memory did not antagonize people enough to reduce their enjoyment suggests that many visitors in recreational settings feel little anxiety or compulsion about how much they are learning.

As an alternative explanation, upon reaching each early trail station, visitors

might have reviewed what they had already heard about it on tape. If, toward the end of the trail, visitors got the tape and trail stations synchronized, they would no longer need to review information at each station encountered. Such differences in the amount of review are also consistent with reduced retention toward the end of the trail.

The effects of questions incorporated into the "question" tape (Treatment 2) suggest that people's short-term memory is limited. While questions called attention to specific information and increased its retention, they simultaneously seemed to downgrade the importance of other information and increased its probability of being lost before getting incorporated into longer-term memory.

A few visitors complained that the frequent questions on the "question" tape made it too much like a "school-teacher." The increased effectiveness achieved for the 12- and 16-minute revised tapes, however, suggests that the sparing use of questions to call attention to key points can add to the overall effectiveness of a presentation without antagonizing visitors.

Although use of a "professional" voice on these revised tapes coincided with increased visitor enjoyment and retention of information for the nature trail, professionalism is not necessarily the relevant factor. During revision of the trail tapes, one radio announcer was tried and rejected as conveying little understanding, concern, and enthusiasm for the subject matter. A useful distinction might be made between general narration and special effects. For general narration, a voice with pleasing quality seems desirable, provided it does not sound too "canned" or

"slick." However, for special effects, other qualities might be preferred. Thus many visitors enjoyed the gravelly-voiced prospector and his colorful speech and anecdote, even though poor recording quality made him difficult to understand.

The pattern in which visitors chose among the five different presentations offered during the "self-selection" phase indicates that not all visitors want the same kind of presentation. The great popularity of the "Devil's Churn" tape (Treatment 7) was undoubtedly affected by the preponderance of visitors who stopped in response to the highway sign reading "Devil's Churn Overlook, 1,000 feet" and who therefore intended only a brief stop. If other strategies had been used to direct people to the trail, the order of visitors' preferences among the five presentations might have been different. A "quick" presentation such as the "Devil's Churn" tape is likely to be welcomed by the more hurried visitors of many settings. However, a majority of the people taking this tape listened to the 3 minutes of optional information as well as the main 5-minute presentation.

Because the "assignment" and "self-selection" phases could have involved slightly different conditions or kinds of visitors, neither enjoyment nor retention levels can be directly compared between the two phases. More importantly, the options available during the "self-selection" phase were selected by visitors rather than being assigned according to a study plan. Thus the greater enjoyment and retention found for the 12- and 16-minute revised tapes (Treatments 6 and 8) may be partly explained by the likelihood that, given the opportunity, the more highly motivated visitors will select the longer tapes. This may partly explain why

the 16-minute revised tape had the highest enjoyment and retention level of any presentation tested. During the "self-selection" phase, less motivated visitors had several less demanding options. The improved showing of the 12- and 16-minute revised tapes suggests as well that initial experience and evaluation permit the final version of nearly any presentation to be improved.

The trail signs and trail leaflets also were tested during different phases, with only the leaflets being "self-selected." Thus these two treatments can be compared only in a very general way. Some visitors wanted information they could read while on the road or at home, and the leaflet did serve this need and as a souvenir.

The levels of enjoyment shown in figure 5 probably reflect the tendency of most people to be agreeable rather than critical when asked for an opinion about someone's efforts. This "congeniality bias" probably caused ratings for all treatments to be compressed toward the high end of the scale. It is likely that visitors exposed to the different treatments actually experienced greater differences in enjoyment than their answers indicated.

Costs for using cassette tapes and tape players appear to be quite reasonable. If a \$30 tape player gave, on the average, 300 trouble-free performances before being fully depreciated, the tape player cost per visitor group would be 10 cents. Costs for tapes, batteries, developing and recording taped presentations, personnel (administering the tapes and players in conjunction with other duties), etc. would depend greatly on the scale of the operation but would probably add between 5 and 20 cents per visitor group. Dividing by the average group size at the Trail of the Restless Waters, slightly over 3.5, would give an average cost per visitor contact of

between 4 and 9 cents. In view of the high effectiveness of the tape players, costs of this order would seem extremely reasonable.

The highly favorable response to the auto tour probably resulted in part because it was offered only to visitors who stopped for information and were thus self selected on the basis of a prior interest in information. However, most interpretation involves noncaptive audiences that are to some extent self selected.

Two points emerged from experience with the auto tour. First, existing mileage markers at 1-mile intervals were a key factor in successful synchronization of the tapes with points of interest. These had been erected by the Washington Highway Department and required only brushing out for improved visibility. Second, visitors will volunteer a great amount of feedback if offered the opportunity. Although compilation of volunteered responses provides no unbiased estimates of visitor enjoyment or recall, it quickly identifies any facets of a presentation that are working especially well or poorly. In other words, volunteered responses provide the kind of information an interpreter can use to identify major problems with a presentation before they become permanent.

The total absence of theft or willful damage was encouraging. Identical results have been obtained in New York and Colorado.^{2/ 3/} Signing a receipt

^{2/} Personal communication with Robert L. Feldman, 1974. Feldman is currently Assistant Professor, Natural Resources Management Department, California Polytechnic State University, San Luis Obispo.

^{3/} Personal communication with Merrit Esmiol, Visitor Information Specialist, U.S. Forest Service, Rocky Mountain Region, Lakewood, Colorado, 1975.

giving one's vehicle license number seemed a sufficient guarantee of returned equipment among the kinds of visitors who seek detailed interpretation. However, unless such receipts are backed by a real willingness and ability to recover unreturned equipment, they might become widely recognized as an empty threat; and equipment losses might become a problem. Provisions would then need to be made for holding a cash deposit while visitors had equipment. During the study many visitors were astonished that a deposit and use charge were not required--indicating that they were already prepared to make a deposit.

GUIDELINES AND CONCLUSIONS

Although it is not possible to prescribe for all conceivable circumstances from the results of one study, the following guidelines and conclusions seem warranted until additional experience and research results are available:

1. Cassette tapes in portable players can provide substantially greater enjoyment and understanding on an interpretive trail than can be expected, on the average, from either trail signs or trail leaflets.
2. To avoid added costs for administering tapes and tape players, they should be offered at a visitor center or other interpretive facility where personnel are already available and can handle them in conjunction with other duties.
3. Although requiring a signed receipt giving address and vehicle license seemed an adequate safeguard against theft or willful damage during the study, the "honor system" may not work over extended periods. Organizations loaning tapes and players probably should develop procedures for recovering

equipment not returned, for holding a deposit sufficient to guarantee such return, or both.

4. For using cassette tapes and tape players on an interpretive trail, an on-the-ground cost per visitor contact of between 4 and 9 cents is likely, depending on the scale of the operation.
5. For a given interpretive trail, tour, or attraction, different tapes should be developed to fit different sets of visitor needs and desires. Factors to consider include hurried versus deliberate visitors, different age groups, different language groups, people wanting advanced versus those wanting elementary presentations, and repeat visitors who would enjoy exposure to new sets of subject matter.
6. Tapes lend themselves to easy revision and should be tried out on visitors before being put in final form.
7. In developing taped auto tours, each tape segment should be keyed to a mileage marker or other readily identified feature.
8. Questions within a taped presentation can increase effectiveness if they are used sparingly to emphasize key points.
9. If introductory or orientation information is to be given at the beginning of a tape, visitors must have sufficient walking (or driving) distance that they can proceed at normal speed without physically passing the first interpretive station before encountering it on tape.

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APPENDIX

QUESTIONNAIRE FOR RESTLESS WATERS NATURE TRAIL, SIUSLAW NATIONAL FOREST

Compared to other trails you have been on or walks you have taken, was this trail

less enjoyable _____
about as enjoyable _____
more enjoyable _____

How did you find out about this trail?

from signs _____	from friends or relatives _____
tourist guide _____	from Forest Service _____
from previous trip _____	other (please specify) _____

What do you consider the most enjoyable thing about this trail?

What do you consider the least enjoyable thing about this trail?

The wind shapes the trees here mostly by

bending the wood _____
killing some of the buds _____
breaking off some of the branches _____

Cape Perpetua was named by

Captain George Vancouver _____
Captain Louis Perpetua _____
Captain James Cook _____

The wax on the needles of Sitka spruce and on the leaves of salal helps them to

resist the drying effects of the wind _____
resist attacks by insects _____
resist intense sunlight _____

The Devil's Churn started as

- a lava tube _____
- a stream channel _____
- a crack in the rock _____

The Devil's Churn is in a layer of rock that is

- 93 thousand years old _____
- 37 million years old _____
- 58 million years old _____

Here on the Oregon Coast the amount of vegetation growing on the forest floor depends mostly on

- the amount of light reaching it _____
- how much of it is eaten by animals _____
- the steepness of the ground _____

For this part of the Oregon Coast, the usual cause of extra large waves is

- a sudden shift in the earth's crust, deep on the ocean floor _____
- an unusually strong gust of wind, far out at sea _____
- waves from 3 different directions arriving at the same time _____

A 1-year-old sea gull will usually be

- white _____
- white with gray wings _____
- brownish and dull colored _____

Clouds and rain are common on the Oregon Coast because

- the dense forests make the air moist and cause rain _____
- moist air from the ocean is cooled as it rises over the mountains _____
- salt in the air makes the water vapor condense _____

The highest tides occur when

- the sun, moon, and earth are all in line _____
- the moon is in its first or third quarter _____
- the sun, moon, and earth are not in line _____

In the zones caused by the rising and falling tides, animals are most likely to be permanently attached

- in the zone covered by water only a few hours a day _____
- in the middle zone covered by water about half the time _____
- in the zone covered by water most of the time _____

Barnacles are

- mollusks, related to oysters and clams _____
- crustaceans, related to the crabs and lobsters _____
- polyps, related to the corals _____

Barnacles are

- free to swim in the ocean only after changing to adult form _____
- free to swim in the ocean only during the early part of their lives _____
- attached to rocks or other surfaces throughout their lives _____

Red alder trees almost always start their lives

- in a dense forest _____
- where soil has been uncovered by a disturbance _____
- where soils are shallow and rocky _____

To do a better job of designing nature trails we need to know whether different groups of people enjoy and remember different kinds of things from them. For this we need the following information:

Male _____ Female _____

Your age _____

Number of people in your group as you walked on this trail _____

The highest year of school you have completed (please circle):

Grammar School								High School				College				Post Graduate		
1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7+

If you are still in school or intend to go back, please circle the highest year you expect to complete.

Grammar School								High School				College				Post Graduate		
1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7+

What is your occupation? _____

Where do you live? _____
City
State, Province, or Country

If you wish, please use the back of this page to add any other comments or suggestions about this trail.

Wagar, J. Alan.

1976. Cassette tapes for interpretation. USDA For. Serv. Res. Pap. PNW-207, 20 p., illus. Pacific Northwest Forest and Range Experiment Station, Portland, Oregon.

Interpretation using portable tape players and cassettes provided significantly greater enjoyment and short-term retention of information on a visitor trail than either trail signs or a trail leaflet. Tape format using questions increased retention of the information so emphasized but at the risk of reducing retention of other information. On-the-ground costs were estimated as between 4 and 9 cents per visitor contact.

KEYWORDS: Recreation, information and education, information media, interpretation, environmental education.

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Within this overall mission, the Station conducts and stimulates research to facilitate and to accelerate progress toward the following goals:

1. Providing safe and efficient technology for inventory, protection, and use of resources.
2. Developing and evaluating alternative methods and levels of resource management.
3. Achieving optimum sustained resource productivity consistent with maintaining a high quality forest environment.

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The FOREST SERVICE of the U.S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.

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